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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/662,004	09/14/2000	Kazuichiro Itonaga	0819-418	9057

22204 7590 01/10/2003
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EXAMINER

BREWSTER, WILLIAM M

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 01/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/662,004

Applicant(s)

ITONAGA ET AL.

Examiner

William M. Brewster

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 13-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

Claims 13-20 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 7.

Applicant's election without traverse of claims 1-12 in Paper No. 7 is acknowledged.

Information Disclosure Statement

The information disclosure statement filed 8 January 2001 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. Any critical or essential to the practice of the invention,

but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Claim 5 contains the feature, "wherein the step (b) is carried out with a photoresist film formed on said substrate" dependent on claim 4 the temperature of claim 1, step (b) describes the plasma of the processing chamber. However, from the figs. 4 (a-c) and the application p. 32, lines 10-15, the photoresist is removed before plasma forms the insulating layer. While figs. 5(a-d) does have a photoresist, this claim does not appear to rely on it as according to claims 1 and 6, the semiconductor is exposed and the insulating film is a gate insulating film.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haken, U.S. Patent No. 4,442,591 in view of Law, European Patent No. 661,732 A2.

Haken teaches a method of forming an insulating film for a semiconductor device for forming, on a semiconductor layer exposed on a substrate, said insulating film through a reaction between at least oxygen and a semiconductor, comprising the steps of: in fig. 1, wherein the step of implanting is carried out with a photoresist film TANK PHOTORESIST formed on said substrate, a step of forming a first active region doped with an impurity of a first conductivity type P TANK IMPLANT, in fig. 3, and a second

active region doped with an impurity of a second conductivity type N-TANK, in fig. 4, wherein a first insulating film and a second insulating film 700 Å, are respectively formed on said first active region and said second active region, wherein said insulating film is a gate insulating film of a MIS transistor, col. 8, line 31 - col. 9, line 12, further comprising, after the step (b), a step of conducting a heat treatment on said insulating film, col. 11, lines 46 - 55.

Haken does not specify a plasma process for forming the insulating film, but Law does. Law teaches A method of forming an insulating film for a semiconductor device for forming, on a semiconductor layer exposed on a substrate 38, said insulating film through a reaction between at least oxygen S and a semiconductor, comprising the steps of: (a) in fig. 1, loading a substrate 38 including said semiconductor layer in a processing chamber 10; and (b) generating, within the processing chamber, plasma biased toward said substrate with the processing chamber kept in an atmosphere including oxygen, and subjecting said semiconductor layer to the biased plasma, wherein the step (b) is carried out at a temperature of 300° C or less, 200° C or less: less than 250° C, wherein the step (b) is carried out in an atmosphere including nitrogen and oxygen, wherein the step (b) is carried out in an atmosphere including a NO gas, namely, a nitriding oxidation atmosphere: nitrous oxide and nitrogen, ABSTRACT. Law gives motivation in p. 2, lines 39-48. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Law's process with Haken's invention would have been beneficial because it reduces porosity lessening penetration of physical abrasion or the penetration of containments.

Claims 2, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haken in view of Law as applied to claims 1, 3-11 above, and further in view of Jang et al., U.S. Patent No. 5,674,783.

Haken and Law do not specify forming an insulating layer in an atmosphere including O₂ but substantially no nitrogen, but Jang does. Jang teaches, in fig. 5, a method of forming an insulating film for a semiconductor device for forming, on a semiconductor layer 20 exposed on a substrate 10, said insulating film through a reaction between at least oxygen S and a semiconductor, comprising the steps of: (a) loading said substrate including said semiconductor layer in a processing chamber; and (b) generating, within the processing chamber, plasma biased toward said substrate with the processing chamber kept in an atmosphere including oxygen, in an atmosphere including O₂ but substantially no nitrogen, and subjecting said semiconductor layer to the biased plasma, wherein a thickness of said insulating film is controlled by adjusting factors including a degree of biasing the plasma in the step, the bias between 420 and 480 Watts, col. 9, line 60 - col. 10, line 40. Jang gives motivation in col. 4, lines 25-34. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Jang's process with Haken and Law's invention would have been beneficial because the methods and materials are readily manufacturable.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 703-305-5906. The examiner can normally be reached on Full Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3432 for regular communications and 703-305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

WB
January 7, 2003


Olik Chaudhuri
Supervisory Patent Examiner
Technology Center 2800